Ohio Science Symposia

Creating Possibilities for Persons with Disabilities
9:00 am - 5:00 pm, Friday, May 1, 1992
Gardner Student Center Oak Room
Arranged by Robert Deitchman

Cosponsored by United Cerebral Palsy and Services for the Handicapped, The University of Akron School of Social Work, the Contemporary Students Association, and The Equal Access to Education Association. Endorsed by Solidarity Ohio.
Opening Remarks by Robert Deitchman

Session I
Focus on Education
John Saros, Presiding

9:00 KIDS ON THE BLOCK. Pattilou K. Judge, Educational Specialist & Coordinator, Mid-Eastern Ohio Special Education Regional Resource Center. 2226 Twenty-Third St., Cuyahoga Falls, OH 44223

Presenting handicap awareness, getting an audience to be both understanding and empathetic without reservation, pity or scorn has long been a difficult task. Mid-Eastern Ohio Educational Regional Resource Center (MEO/SERRC) makes that task not only simple but enjoyable to the presenter and the participants by combining informational dialogue with the Kids on the Block (KOB) puppet presentation. Local information is highlighted by a presenter familiar with the needs of the target audience. The Kids on the Block are very special puppets. They are nearly life size and like real children they have definite likes, dislikes, hopes, fears, talents and limitations. They teach adults and children to accept the likenesses and differences that we all have, by coping with their own disabilities. Developed in 1977 by Barbara Aiello of Washington, D.C. as a response to Public Law 94-142 - the Individuals with Disabilities Education Act, the copyrighted "Kids" are now in over 700 community-based programs in 49 states and 14 countries. In the Summit, Portage and Medina Counties, volunteer puppeteers are trained by Pattilou K. Judge at MEO/SERRC. During the 1990-91 school year over 3000 people saw some of the 18 different "Kids" presented by MEO/SERRC'S 73 volunteers.

9:45 DEVELOPMENT & IMPLEMENTATION OF A COMMUNITY-DRAWN, LIFE-BASED CURRICULUM FOR INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES. Dr. Norman Czobaj, Superintendent of Summit County Bd. of Mental Retardation & Developmental Disabilities, 89 E. Howe Rd., Tallmadge, OH 44278-1099

Over the past 15 years, research and work in the field of education of the developmentally disabled has demonstrated clearly the need to move such educational efforts out of the classroom and into real life settings of the regular community. At the very minimum, strategies and tactics used in educating persons with mentally and physically handicapping conditions, should demonstrate a combination of instructional activities that show a combination of classroom skill preparation and in the community-setting applications of skills directly related to the student's need The most recent review of school programs in Ohio suggested that curriculum and districts IEP process be re-designed to promote more and direct community involvement of students. The development and implementation of a community-drawn community life-based curriculum is a priority. It must alter the present self-contained system of classroom instruction and utilize the community setting as a means to increase the amount of student instruction time in the "real community environment."

10:15 THE EXPANDING ROLE OF THE SPECIAL EDUCATOR. Dr. Mary Beth Kluge, Special Education, Akron Public Schools, 70 N. Broadway St., Akron, OH 44308

The role of the special educator is an evolving one. In Ohio and in the nation we face new challenges as we provide services for preschool children, write transition plans for those sixteen and above, serve an increasingly medically fragile population and integrate community based services for the severely emotionally disturbed. The education of handicapped children in the least restrictive environment has increased awareness and acceptance. Dedicated and competent teachers and supportive building administrators, working together, have facilitated the transition of children to the public schools. As we embrace new preschool regulations and the opportunity to develop experimental programs, we are entering an exciting period of implementing a model of education based upon the needs of children rather than upon categorical labels.

10:45 HIGH TECH, LOW TECH AND EVERYTHING IN BETWEEEN. Patti Place Porto, Coordinator, Technology Training Project, Family Child Learning Center, 90 W. Overdale Dr., Tallmadge, OH 44278

All children learn through interacting with and exploring the world around them. Children with disabilities may have these experiences restricted, delayed, distorted or absent due to physical, sensory, or cognitive impairments. This presentation will discuss how technology can be used to provide children with disabilities successful learning experiences and independence. Technology applications can range from simple low tech (e.g., making the handle bigger so a child can hold a toy independently) to high tech (e.g., computers). Examples will be presented on how technology can be used to increase interaction, participation, communication, learning and mobility. For children with disabilities, technology can open up a whole world of independence and learning.

Session II
Focus on Advocacy and Legislation
Jill Regula, Presiding

1:00 THE SPIRIT OF THE ADA. John Saros, Executive Director, United Cerebral Palsy and Services for the Handicapped, 326 Locust St., Akron, OH 44302

The American Disabilities Act represents the culmination of almost two decades of increasing participation into American society by people with disabilities. Compulsory education, enacted in the last century, did not exist for school-age children with disabilities until the 1970s. Today, the Americans With Disabilities Act makes compulsory recognition of the civil rights of people with disabilities. This non-discrimination act makes no effort to seek redress, but rather operates to bar continuing or future discrimination against people with disabilities.The purpose of the Act is three-fold. First, the establishment of a clear and comprehensive national mandate to end discrimination against individuals with disabilities. Second, to bring people with disabilities into the mainstream of American life, and, third, to ensure that the federal government plays an essential role in enforcing these standards on behalf of people with disabilities.The Americans With Disabilities Act asks us to look past the disability and see the person first. The challenge is to treat people with disabilities with the respect that their capabilities deserve.

1:30 WILL THE REAL ADVOCATE PLEASE STAND UP. Kathy Bachmann, Parent Coalition for Persons with Disabilities, 281 Locust, Akron OH 44308

Most social service agencies today have begun to take a long hard look at how they serve individuals. Private industry is giving lessons to public servants on how to treat clients or students like customers. Making systems respond to individuals is what advocacy is all about. Parents are the most natural and powerful advocates by virtue of their parenthood. Knowledge and skills do not come automatically with the birth of a child with special needs. It is necessary to help parents gain knowledge of the differences of their child, the needs of that child, and the way the service system can and should help the family and child reach the height of his potential.There is a growing movement among parents to teach and encourage one another in effective advocacy. Parenting any child today is an awesome responsibility. If the child has a difference, that job is magnified and intensified.The remarkable fact is that many parents, as they learn to advocate for their own child, become articulate and powerful spokespersons for whole categories of kids. Cooperation between parent and professional should result in systems truly responding to the person.

2:00 SELF ADVOCACY BY PERSONS WITH DISABILITIES. Robert Deitchman, Ph.D. School of Social Work, The University of Akron, Akron, OH 44325 and President, Equal Access to Education Association, 795 Roslyn Avenue, Akron, OH 44320.

For the self-advocacy movement to succeed there must be a unity of effort of those individuals with disabilities and other populations in need of assistance but do not fall in the category of those with disabilities. There seem to be some basic principles (first identified and delineated by Williams and Schoultz, 1982) on which self advocacy is rooted: 1) the needs of all persons with disabilities for dignity, respect and an ability to speak for themselves is critical; 2) persons with disabilities want to be perceived by others as having abilities rather than merely as individuals having handicaps and limitations; 3) those with disabilities can and should be trained to self advocate and organize; 4) individuals with disabilities can best be represented by themselves; 5) through self advocacy most barriers can be neutralized; 6) everyone should be able to participate to the extent that they want and are able; 7) self advocates must be part of the training process of those individuals who intend to work with individuals with disabilities; 8) there must be consistent support for the development of self advocacy and leadership skills among those with disabilities. The relationship of the training of those in service related groups will be discussed in relation to the development of self advocacy.

2:20 DIMENSIONS OF ACCESSIBILITY: PHYSICAL AND PSYCHOSOCIAL CONSIDERATIONS. Norman Ingersoll, and Suzanne Seeman, Contemporary Students' Organization, School of Social Work, University of Akron, Akron, OH 44325.

This paper is concerned with the issues that are critical in creating successful accessibility for persons with disabilities. In light of the passage of the American Disability Act, the proposed accommodation standards for building construction, and alterations of existing facilities are addressed. This includes disability-specific design criteria, and the definitions and descriptions of the available technical assistance. This paper also stresses the need for research-based design statements to facilitate sound decision making by architects, planners, and engineers. Too often, a design is implemented without complete consideration of the actual needs of persons with disabilities. Further, a firm understanding of such needs will not be fully embraced without the application of a holistic approach. Not only must the physical attributes of a disability be researched, but the social and psychological aspects must also be carefully examined. In illustration, persons with disabilities are faced with stigmatization by society, and it is these detrimental attitudes that present a primary barrier to maximizing independence. A multi-disciplinary approach, as well as an ecological perspective is needed in promoting acceptance toward disabilities, and thus, the motivation to deal with the compliance issues of accessibility.

2:45 DETERMINANTS OF RESPONSIVENESS OF INDIVIDUALS WITH DISABILITIES TO HOME BASED CARE. Gloria Rookard, R.N., Owner/Operator: Universal Nursing Services, Inc., 402 E. Market Street, Akron, OH 44304.

In developing the services available to clients with disabilities there was an intent to insure that treatment would be on an outpatient basis and would increase the client's level of independent living. Accordingly, there was an attempt to identify which clients would be more successful given our mode of interventions. It is fair to say that there are no sweeping generalizations possible. Some clients who were assessed as being potential successes proved inaccessible to individual treatment. One of these had organic damage. Others who would not have been deemed potential successes turned out to be successes. The expectation is that the more work that is done with those individual clients with disabilities, some clearer determinants will emerge. For the time being however, there is sufficient evidence to indicate that individuals with disabilities that might be considered intermediary, will, with the help of their families succeed in increasing their level of independence with home based care. Evidence will be presented which supports the notion that the current health care system is geared more towards preventing greater independence.

Session III
Focus on Employment
Robert Deitchman, Presiding

3:30 EMPLOYEE ASSISTANCE PROGRAMS. Marvin D. Feit, Ph.D., The University of Akron, School of Social Work, Akron, OH 44325-8001.

Employee Assistance Programs should operate in the same manner for people with disabilities as with others. An early premise of EAP's is that workers (line or staff) are able to obtain help with personal problems which are interferring with productivity. EAP's have evolved in the past 15-20 years to include wellness and prevention programs. People with disabilities must be incorporated into these programs and supported as they take advantage of the basic services. While the expectation is that this population is able and capable of using these services, it may be important to "reach out," encourage, or provide budget for their involvement. There is no reason hindering people with disabilities into the EAP.

4:00 TRAINING PROGRAMS FOR MINORITY PERSONS WITH DISABILITIES. Vernon L. Odom, Executive Director, Akron Community Service Center and Urban League, Akron, OH 44304.

In 1964, Thomas Pettigrew argued that even if all the prejudice and discrimination disappeared as a result of the passage of the Civil Rights Act, the problems of African Americans would remain (Sigelman & Welch, 1991). The bottleneck to economic progress that was identified was employment. African Americans have traditionally had unusually high rates of unemployment and at a higher level than for whites. While education is the basic key that will make a difference, African Americans still operate at a greater disadvantage in the job market than those of equal educational level and non-black. For those who are minorities and disabled this effect is even greater. Dual labor market theory is relevant here and will be discussed. Finally, there is a significant income difference/gap when correlated with race. Whether African Americans are progressing or losing ground is a subject of current intense debate. There has been a direct impact of the above described socioeconomic realities on training programs. The Urban League has been a leader in developing programs for minorities and the disabled. A description of those programs will be given.

4:30 TECHNOLOGY SERVICES IN SUPPORT OF EMPLOYMENT OF COLLEGE STUDENTS WITH DISABILITIES. David Suveges and Ken Nuzum, Ohio Rehabilitation Services Commission, Suite 103, 161 S. High St., Akron, OH 44308

One of the major functions of the Ohio Rehabilitation Services Commission is to enable and empower individuals with severe handicaps to pursue and seek employment in areas of their own interest. This presentation will discuss the various means used to assess the different technology needs for job readiness and employment. Several distinct characteristics of need identification are implicit in the vocational rehabilitation agency's definition of "individual with a severe handicap." These have been noted by Mckillip (1987), Reid (1985), Dunst, Trivette, and Deal (1988) and further developed in various ways by the counselors who serve clients who work together with BVR. 1) There must be some psychological awareness of the difference between what is present and what ought to be present for a student to succeed; 2) the role of personal values and beliefs in determining the client's assessment of his or her situation; 3) there must be some evaluation or awareness of what resources and assistance are needed and available to reduce perceived discrepancies; 4) there is a need to identify the methods for procuring the needed resources to reduce any perceived discrepancies to succeed.

Concluding remarks by Suzanne Seeman

Ohio Science Symposium
Educational Output and School Choice: The Legacy of Senate Bill 140
9:00 am, Friday, May 1, 1992
Gardner Student Center Pine Room
Arranged by John Treacy
Russell Harris, School Finance Consultant, Ohio Education Association, Presiding

The purpose of this symposium is to demonstrate that significant differences in educational achievement test scores and ninth grade proficiency pass rates exist which opens the possibility of educational

improvements resulting from interdistrict student transfers if parents can gain the relative performance information.

9:00 MEASURING EDUCATIONAL OUPUT: OHIO NINTH GRADE PROFICIENCY 1990 PASS RATES BY SCHOOL AND DISTRICT, J. Treacy, M. Verkhuska and J.P. Powers, Dept. of Economics, Wright State University, Dayton, OH 45435

Reading, writing, math and civics ninth grade proficiency tests, required in 1993 and after for an Ohio diploma, are the only statewide tests given in all districts. Pass rates show wide variations between Districts [Ottawa Hills passed 89% of its ninth graders at the first test sitting, while Jefferson Township Local in Montgomery County passed only 6%] and schools within some districts. Wide range in performance indicates that student interdistrict transfer choice programs available under Senate Bill 140 in the Fall of 1993 may spur poorly performing schools and districts to upgrade their programs to avoid budget losses. Ranking of schools and districts on the basis of their pass rates may be the easiest and useful way of conveying information about program quality to parents making such decisions.

Discussant, Colleen Marshall, Education Reporter, WCMH-TV Channel 4, Columbus

9:30 MEASURING EDUCATIONAL OUPUT: RANKING OHIO 1991 ACHIEVEMENT SCORES BY SCHOOL AND DISTRICT, J. Treacy, M. Verkhuska, K. Albright, S. O'Bryant and M. Hanano, Dept. of Economics, Wright State University, Dayton, OH 45435.

A composite index of 4th, 6th, 8th and 10th grade mean normal curve equivalent achievement test scores in reading, math, and language was constructed for 612 districts and 3394 schools. Scores in districts ranged from Wyoming's 71 to Trimble Local in Athens County's 39. The state average score was 53 and Standard Deviation 5.4. These figures are similar to those found in the data for 1990 test scores. Not all high scoring districts are high spending or located in high income areas. Wide variations between **Districts** and **School** performance [even within districts] indicate that student interdistrict and intradistrict choice programs available under Senate Bill 140 in the Fall of 1993 may spur poorly performing schools and districts to upgrade their programs to avoid budget losses. Ranking of schools and districts on the basis of their pass rates may be the easiest and most useful way of conveying information about program quality to parents making such decisions.

Discussant, Jean Sandver, President, Ohio Association of Economists and Political Scientists.

10:00 DOMINANT OHIO SCHOOL DISTRICTS IN THE CHOICE GAME. J. Treacy, M. Verkhuska, Lu Yu and, Laurel Hunt, Dept. of Economics, Wright State University, Dayton, OH 45435

Senate Bill 140 provides for interdistrict transfers in the Fall of 1993 between those that physically abut. We constructed a computer file that identifies each district in terms of those that it touches and used it with test score information to pinpoint **dominant**, districts which would be expected to attract students from all others in a choice regime. **Dominants** (those that touch no district that rank higher] number 94 and contains only 40 out of the top 100 ranked districts out of 612 due to the fact that pockets of excellence exist where high performing districts adjoin. This leaves parents in low scoring **dominants** such as Norwood [Rank=574] with no good option since it is surrounded by Cincinnati [R = 595] . Vouchers spendable in non public schools or changes in rules restricting choices to verging districts will be the only way to offer pupils in districts such as these viable alternatives to improved instruction.

Discussant, Robert Yearout, Superintendent, Wyoming City School District Wyoming, OH

Ohio Science Symposium
Liquid Crystals
9:00 am, Friday, May 1, 1992
Gardner Student Center Carnation Room
Arranged by Jiming Liu
Peter Palffy-Muhoray, Presiding

The purpose of this symposium is to promote communications among researchers and to establish public awareness of liquid crystal science.

9:00 ELECTROMECHANICAL RESPONSES OF FERRO-ELECTRIC LIQUID CRYSTALS. A. Jákli and A. Saupe, Liquid Crystal Institute and Department of Physics, Kent, OH 44242.

Application of AC electric fields on thin films of chiral smectic C liquid crystals causes mechanical vibrations of the samples and the cover plate (e.g. electromechanical responses). The vibrations of the boundary plates were measured in different directions as the function of frequency, voltage and temperature. Linear and quadratic responses were analyzed for various alignments (chevron, striped bookshelf and uniform bookshelf textures). At low frequencies (typically below 1kHz) the linear response is only horizontal parallel to the layers. It is caused by the coupling between the field induced director rotation and the flow. In the vertical direction resonance like responses were observed. They are probably due to layer compressions (true piezoelectricity) and the frequency depends on the layer compression modulus and the sample dimensions. The study of the electromechanical responses has not only scientific interest, but can have practical importance.

9:20 CONFIGURATION TRANSITION IN SUB- MICROMETER CAVITIES. R.J. Ondris- Crawford, S. Zumer, and J.W. Doane. Dept. of Physics and Liquid Crystal Institute, Kent State University, Kent, OH 44242-0001.

Studies of uniaxial nematic liquid crystals confined to cylindrical geometries, which in the past mainly involved structures with perpendicular boundary conditions, are extended to structures with tangential boundary conditions. Tangential anchoring of liquid crystal molecules at the surface of Nuclepore filters is achieved by treating the submicrometer cylindrical cavities with Polyimide. A configuration transition from planar to non-planar structures as a function of curvature is observed in these cavities using deuterium nuclear magnetic resonance (^{2}H-NMR). The detailed treatment of the molecular anchoring and surface elastic energies corresponding to these structures is presented.

9:40 THE SADDLE-SPLAY SURFACE ELASTIC CONSTANT. G.P. Crawford, D.W. Allender and J.W. Doane. Liquid Crystal Institute and ALCOM Center, Kent State University, Kent, OH 44242-0001.

Despite the successful application of elastic theory to nematic liquid crystals pioneered by Oseen and Zocher more than fifty years ago, the importance of the saddle-splay contribution has remained an open question because there have been no measurements of the associated surface elastic constant, K_{24}. The measurements of K_{24} have been an experimental challenge for two basic reasons; (1) the simultaneous presence of bulk elastic distortions and (2) the effects of surface anchoring. The first measurements of K_{24} are presented that were made from observations of nematic director-field configurations and a configuration transition discovered in submicrometer-size cavities of Nuclepore membranes under selected surface preparations and wall curvatures. Small differences in the director-field configurations imposed by the curvature or elastic properties of the nematic liquid crystal are monitored by deuterium nuclear magnetic resonance.

10:00 ORIENTATIONAL EFFECTS ON CONFINED *nCB* LIQUID CRYSTALS. G. Iannacchione and D. Finotello. Dept. of Physics and Liquid Crystal Institute, Kent State University, Kent, OH 44242.

Heat capacity measurements via ac calorimetry have been performed on the thermotropic liquid crystal series alkylcyanobiphenol (nCB). This series is confined within the nearly cylindrical cavities of Anopore membranes. These disk-like membranes, 60 μm thick, have cavities 0.2 μm in diameter and a porosity of about 40%. For the nCB materials, orientation of the nematic director within the pores is aligned parallel to the pore axis. Treatment of the inner surface of the pores with a lecithin surfactant results in a perpendicular alignment of the nematic director relative to the pore axis. A variety of phase transitions are studied in these confining pores for both orientations. These include the second order smectic-A to nematic phase transition of 8CB, the weakly first order nematic to isotropic phase transition of 5CB, 7CB, and 8CB, and the first order smectic-A to isotropic phase transition of 10CB. Comparisons of heat capacity features such as amplitudes, transition temperature shifts, rounding and broadening of the transitions will be made with bulk measurements.

10:35 THE INCOMMENSURATE SMECTIC-A PHASES: WHERE ARE THEY?* Prem Patel, Li Chen, and Satyendra Kumar, Department of Physics and Liquid Crystal Institute, Kent State University, Kent, OH, 44242-0001.

The phenomenological models of frustrated smectics predicted[1] several incommensurate Sm-A phases: the Sm-A_{i1} and Sm-A_{i2} phases in the weak coupling, and the Sm-A_{is} (soliton) phase in the strong coupling limit. The reports[2] of the existence of the Sm-A_{i2} phase in DB70CN + 80CB mixture and of all three phases in DB80CN + 80BCAB system engendered further investigations. A reexamination of these materials, with high resolution x-ray diffraction, has shown[3] that the Sm-A_{i1} and Sm-A_{i2} phases are coexistences of the partial bilayer Sm-A_d and bilayer Sm-A_2, and the Sm-A_d and Sm-A_1 phases, respectively. The Sm-A_{is} phase is a coexistence of the Sm-A_{i1}, Sm-A_{i2}, and Sm-A_{is} phases. The observed coexistences appear as a consequence of slow equilibration of these systems and presence of chemical impurities. Although the possibility of their existence in other more suitable systems cannot be ruled out, as of now, there are no known incommensurate phases.

*Supported by the National Science Foundation grant DMR-88-19680

1. J. Prost and P. Barois, J. Chim. Phys. **80**, 65 (1983); J. Wang and T.C. Libensky, J. Phys. (Paris) **45**, 1653 (1984).
2. B.R. Ratna, R. Sashidar, and V.N. Raja, Phys. Rev. Lett. **55**, 1476 (1985); R. Sashidar, B.R. Ratna, Liq. Cryst. **5**, 421 (1989).
3. S. Kumar, Li Chen, and V. Surendranath, Phys. Rev. Lett. **67**, 322 (1991).

10:55 SANS AND X-RAY SCATTERING STUDY OF THE NEMATIC TO SMECTIC-A PHASE TRANSITION IN A SIDE-CHAIN POLYMER LIQUID CRYSTAL*. Joseph T. Mang, Prem Patel, S.T. Shin, and S. Kumar, Department of Physics and Liquid Crystal Institute, Kent State University, Kent, OH, 44242; and T.P. Rieker, LANSCE, Los Alamos National Laboratory, Los Alamos, NM, 87545.

Some side chain polymer liquid crystals are known to exhibit the smectic-A phase and a wide nematic phase. These materials provide a new perspective on, and an opportunity to study the nematic-smectic-A (NA) phase transition. We have conducted a small angle neutron scattering (SANS) study of the radius of gyration (R_g) of the polymer main chain and high-resolution x-ray diffraction measurements of the smectic order correlation lengths, parallel and perpendicular to the director, near the NA transition of poly(metha) acrylate (PMA-6-OCH3) (mol. wt. ~ 80,000 - 100,000). The sample was aligned, in the nematic phase, by keeping it in a high magnetic field for long periods of time. R_g, measured in the nematic and smectic-A phases, was found to have temperature dependent anisotropy in directions parallel and perpendicular to the director. The anisotropy showed a marked change at the NA transition. The smectic order correlation lengths were found to diverge anisotropically. The results of our study will be presented and compared with results of previous studies on molecular liquid crystals.

*Research Supported by NSF grant DMR-88-19680.

11:15 RELAXATION TIME MEASUREMENTS OF THE ORDER PARAMETER AT THE NEMATIC-ISOTROPIC PHASE TRANSITION NEAR A LANDAU POINT. Jiming Liu and Alfred Saupe, Liquid Crystal Institute, Kent State University, Kent, OH 44242.

The relaxation of the birefringence was measured close to the nematic-isotropic phase transition for a KL/1-decanol/D_2O mixture near the Landau point. The birefringence was induced by a magnetic field. The decay of the birefringence was monitored after the field was suddenly turned off. The relaxation time constant diverged as the transition temperature was approached. The divergence followed a power law with an exponent of 1.36, which deviated from the mean field value of 1. The static response of the system to the magnetic field was also measured independently. The results are discussed and compared in the framework of the Landau- de Gennes phase transition theory. Research supported by the National Science Foundation under the Grants DMR85-12253 and DMR89-03453.
Panel discussion moderated by J. Liu.

Ohio Science Symposium
Neural and Non-Neural Regulation of Skeletal Muscle Fiber Types in Vertebrates
1:30 pm only, Friday, May 1, 1992
Gardner Student Center Cedar Room
Arranged by Jon M. Walro, Presiding

The purpose of this symposium is to provide a forum for the presentation and discussion of regulation of muscle fiber types in vertebrates.

1:30 MYOGENIC AND NEUROGENIC REGULATION OF AVIAN SKELETAL MUSCLE FIBER REGENERATION. Robert S. Hikida & Bruce M. Hather. Department of Zoological & Biomedical Sciences, Ohio University, Athens, OH 45701.

When skeletal muscle is transplanted from one site to another, it undergoes ischemic degeneration. The subsequent activation of satellite cells associated with the former muscle fibers allows the muscle to undergo myogenesis and regeneration. Some avian muscles have distinct patterns of fiber types which make these useful for determining myogenic versus neurogenic influences on regeneration of fiber type patterns. By using a variety of techniques with pigeon muscles, we have established that the acetylcholinesterase (AChase) activity, myofibrillar ATPase activity, muscle fiber numbers, mean diameter of fibers, percentage of fiber types, and ultrastructure of identified fiber types were all myogenically regulated by the donor muscle. Nerve fibers going to the AChase sites of the foreign fiber types did not innervate these sites. Thus successful innervation of regenerated muscle fibers requires that the appropriate fiber type be regenerated, and fiber types incompatible with the innervation at that site remain denervated. In contrast, many of the properties of the donor muscle determine how successful regeneration of the transplant will be and will determine the properties of the muscle that is eventually regenerated.

2:00 STRETCH-INDUCED ALTERATIONS OF FAST AND SLOW MYOSIN EXRESSION IN A SLOW SKELETAL MUSCLE OF *COTURNIX, COTURNIX, JAPONICA*. S.E. Alway, J.A. Carson, W.J. Roman, D.L. Carl, and J.C. Baldi. Neuromuscular Laboratory, Department of Exercise Science, The Ohio State University, Columbus, OH 43210.

Stretch-overload has been shown to elevate muscle mass in the avian anterior latissimus dorsi (ALD); however, it is not known if these adaptations would modify fiber type or myosin isoform expresslon in a uniform manner along the length of the innervated fibers of this slow tonic muscle. A weight was added to the right wing of 40 adult quail while the left wing in each bird served as an intra-animal control. ALD mass increased by -0.1%, 70%, 122%, 148% and 169% after 0, 7, 14, 21 or 30 days of stretch. ALDs were divided into proximal, middle and distal portions. Cross-sections from these regions were reacted against monoclonal antibodies for fast, slow or non-adult myosin heavy chain. The percent of fibers expressing fast myosin (FM) was significantly less in the distal region of control muscles (6.2%), relative to proximal (10.9%) and distal (11.9%) regions. The percent of FM increased in the proximal and distal regions at day 30 of stretch (15.7% and 11.9%, respectively). Non-adult forms of myosin were <1% in adult muscle but exceeded 5% of myosin expression at day 5 and 7 of stretch. Native and denatured myosin gel electrophoresis demonstrated up-regulation of FM3 and FM2 isoforms in proximal and distal regions by day 14. FM1 was found in only rare instances in any region of control muscles, but it was found in all regions of stretched muscles at 14-21 days. Fast light chain-1 was upregulated by day 7 in proximal and middle regions of the ALD, whereas fast light chain-3 was not up-regulated until days 14-21. Slow myosin-2 and slow-light chain-2 were up-regulated, during the first week of stretch. These data demonstrate non-uniform alterations of fiber type and myosin expression in response to stretch-induced hypertrophy of the ALD with intact innervation.

2:45 NEURAL REGULATION OF SKELETAL MUSCLE FIBER TYPES: A COMPARISON BETWEEN ELECTRICAL STIMULATION AND EXERCISE. Robert S. Staron, Department of Biological Sciences, Ohio University, Athens, OH

Adult mammalian skeletal muscle fibers can be separated into two major types: slow- (type I) and fast-twitch (type II). Using various methods, this

broad classification scheme can be broken down into numerous subtypes (e.g., types I, IC, IIC, IIAC, IIA, IIAB, IIB). However, muscle fibers are not static structures. Each fiber is under the control of the nervous system and impulse activity plays an important role in the regulation of skeletal muscle fiber types. Muscle fibers are able to alter the phenotypic expression of specific proteins in response to altered functional demands and/or neuromuscular activity. This plasticity can be dramatically demonstrated by the fast-to-slow fiber type conversions induced by chronic, low frequency electrical stimulation of a fast muscle. Exercise, like the stimulation model, delivers increased activity to a muscle, but the total active time is much less. As a result, exercise-induced muscular adaptations are similar to adaptations induced by chronic stimulation but to a lesser degree.

3:15 NEURAL AND NON-NEURAL REGULATION OF "SPINDLE SPECIFIC" MYOSIN HEAVY CHAINS IN REGENERATED RAT INTRAFUSAL FIBERS. Jon M. WALRO and Jun WANG, Department of Anatomy, Northeastern Ohio Universities College of Medicine, Rootstown, OH 44272.

Intrafusal fibers of muscle spindles in rat hindlimb muscles express some myosin heavy chains (MHCs) which are not expressed by extrafusal fibers. The influences of sensory innervation, motor innervation and non-neural factors in regulation of these "spindle-specific" MHCs were studied by immunocytochemistry of muscles which regenerated in the presence of motor and/or sensory innervation, and in the absence of any innervation. Newly regenerated intrafusal myotubes express only embryonic MHC in the absence of innervation, thus "spindle-specific" MHCs are probably neurogenic in origin. Expression of these the MHCs correlates with innervation by afferent, but not efferent neurons in mature muscle grafts. These data are consistent with data derived from developmental and neural ablation studies implicating afferent innervation as a morphogenetic determinant of intrafusal fiber type. The relevance of these data to the origin of intrafusal fibers and the capacity of intrafusal fibers to regenerate following muscle injury will be discussed.
Discussion

Ohio Science Symposium
New Concepts in Sympathetic Nervous System Function and Dysfunction
9:00 am, Friday, May 1, 1992
Gardner Student Center Cedar Room
Arranged by Michael B. Maron, Presiding

The purpose of this symposium is to highlight recent advances that are providing new insights into the function of the sympathetic nervous system in health and disease.

Introduction by Michael B. Maron. Discussion will follow each paper.

9:00 EXERCISE TRAINING ATTENUATES BAROREFLEX FUNCTION. Stephen E. DiCarlo, Dept. of Phys. NE OH Univ. Col. Med., P.O. 95, Rootstown, OH 44272

Endurance exercise training has been suggested to alter the autonomic nervous system resulting in an apparent increase in parasympathetic efferent activity and a decrease in sympathetic efferent activity. In this context, it is interesting to speculate that exercise training may result in an altered neural control of the cardiovascular system by changing the interaction of systems directly involved in controlling the circulation. Changes in autonomic neural activity could be beneficial to patients at high risk for sudden cardiac death. For example, a reduction in the incidence of sudden cardiac death among postinfarction patients participating in a multifactorial intervention program that included exercise has been reported. We examined the effects of exercise training on the baroreflex regulation of the cardiovascular system. Specifically, the direct inhibiting influence of the cardiopulmonary baroreflex and the interaction of the cardiopulmonary and arterial baroreflexes in the regulation of sympathetic drive to the cardiovascular system was examined. The influence of peripheral and central mechanisms in mediating the autonomic adaptation associated with exercise training was also examined. The results demonstrate that the tonic inhibiting influence of the cardiopulmonary baroreflex on sympathetic activity and the arterial baroreflex is enhanced as a result of exercise training and that this response is mediated by peripheral and central mechanisms.

9:30 INTERACTION OF SYMPATHETIC AND LOCAL MECHANISMS OF VASCULAR CONTROL. John N. Stallone. Department of Physiology, Northeastern Ohio Univs. College of Medicine, P.O. Box 95, Rootstown, OH 44272.

As one of the primary systemic vasoconstrictor mechanisms in the mammalian cardiovascular system, the sympathetic nervous system (SNS) plays an important role in the regulation of systemic vascular resistance and, therefore, arterial blood pressure. SNS-induced vasoconstriction results from both neural and circulating catecholamines (norepinephrine, NE and epinephrine, EPI), which stimulate vascular smooth muscle (VSM) contraction via activation of α-adrenergic mechanisms. There is increasing evidence from both *in vitro* and *in vivo* studies that humoral substances produced by the vascular endothelium act as local regulators of VSM tone and modulate actions of systemic vasoconstrictors, such as NE. Factors that relax VSM and attenuate vasoconstriction are endothelium-derived relaxing factor (EDRF), endothelium-derived hyperpolarizing factor, and prostacyclin; those that contract VSM and potentiate vasoconstriction are endothelin, prostanoid endoperoxides/thromboxanes, local ANG II, and oxygen free-radicals. Studies from our laboratory and others reveal that the gonadal steroids influence both VSM contraction and endothelial relaxing factors (EDRF, prostacyclin), resulting in marked sex differences in vascular reactivity to sympathetic and other systemic vasoconstrictors in both normotension and hypertension. Thus, vascular tone is determined by the balance of effects of systemic vasoconstrictors and local endothelium-derived vasoactive substances, both of which may vary with vascular region and physiological state. Therefore, alterations in the release of local relaxing and contracting factors may contribute to the pathogenesis and/or maintenance of hypertension via abnormal elevation of systemic vascular resistance. (Supported by AHA/Ohio Affil.)

10:00 THE ROLE OF THE SYMPATHETIC NERVOUS SYSTEM IN THE DEVELOPMENT OF HYPERTENSION. Daniel L. Ely, Dept. of Biology, The University of Akron, Akron, OH 44325.

New research findings from key laboratories throughout the world are supporting the concept that the sympathetic nervous system (SNS) is involved in the development of hypertension. Both animal and human evidence suggest that central and peripheral nervous mechanisms are involved in hypertension and that both direct nerve recording and plasma levels of norepinephrine may be used to measure the activity of the SNS. One of the important issues in the field is the nonuniformity of plasma norepinephrine (NE) levels released from different organs. The rate of spillover to plasma is dependent upon the: SNS firing rate, nerve density, organ mass, synaptic cleft width, NE uptake, degradation, capillary permeability, and blood flow. Also SNS mediated stress responses are potentiated in hypertensives and both high and low salt diets modulate the SNS activity. Another important issue is the synergism between dietary salt and stress in modulating SNS response patterns. Also the SNS demonstrates differential responses that are tissue specific. Our laboratory has shown that the SNS is hyperreactive in spontaneously hypertensive rats and that stress potentiates salt appetite which can further accelerate the hypertensive process. Studying these issues can further our understanding of the direct and indirect involvement of the SNS as a pathogenic factor in cardiovascular disease.

10:30 EFFECT OF MASSIVE SYMPATHETIC ACTIVATION ON LUNG FUNCTION. Michael B. Maron. Dept. of Physiology, NE Ohio Univ. Col. Med., P.O. Box 95, Rootstown, OH 44272.

Massive activation of the sympathetic nervous system (SNS) may occur in individuals with head trauma, subarachnoid hemorrhage, or seizures. The resulting "sympathetic storm" produces severe, but transient, systemic and pulmonary hypertension and may cause pulmonary edema (neurogenic pulmonary edema) and arterial hypoxemia. The pulmonary hypertension is generally thought to result from the translocation of blood from the systemic to the pulmonary circuit. We have been studying a model of this disorder, in which the SNS is activated by the intracisternal injection of veratrine in chloralose-anesthetized dogs. In this model, veratrine produces increases in systemic and pulmonary arterial pressure that may reach in the extreme, respectively, 300 and 100 torr. With large increases in pulmonary arterial pressure, alveolar edema develops, and the animals may exhibit arterial hypoxemia due to the development of right-to-left shunting. Further stress on the oxygen transport system occurs via an increase in metabolic rate and a reduction in cardiac output resulting from left ventricular dysfunction. The latter alterations are thought to be mediated by catecholamines. (Plasma epinephrine and norepinephrine concentrations may rise 2-3 orders of magnitude after veratrine administration.) Although,

the pulmonary edema has a primary hydrostatic component, pulmonary vascular pressures may sometimes rise high enough to injure the vasculature. Under these conditions, further edema formation could occur even after normal vascular pressures are reattained because of an increased vascular permeability. Pulmonary venoconstriction and ventricular dysfunction may accentuate the amount of edema formation under such conditions. (supported by HL 31070)

11:00 EFFECT OF MASSIVE SYMPATHETIC ACTIVATION ON CARDIAC FUNCTION. Charles F. Pilati. Dept. of Physiology, NE Ohio Univs. Col. Med. P.O. Box 95, Rootstown, OH 44272.

Physiologic concentrations of norepinephrine and epinephrine improve cardiac function by increasing heart rate and the strength of the cardiac contraction. Nevertheless, pathologic concentrations of these substances often produce myocardial damage and diminished left ventricular (LV) function. My studies are focused on the potentially damaging effect of massive sympathetic nervous system (SNS) activation on the heart, as might occur following head trauma, seizures, or stroke. In these studies, the SNS of anesthetized rabbits or dogs is intensely activated by injecting veratrine alkaloids into the cisterna magna. The intense SNS activity causes a transient systemic and pulmonary hypertension, and tachycardia which are associated with markedly elevated plasma norepinephrine and epinephrine concentrations. Our results have consistently shown that LV function is significantly diminished by massive SNS activity. The decline in LV performance may begin within 1 hr after the sympathetic "storm". Histologic damage similar to that produced by excessive catecholamines was observed in the hearts from these animals. The SNS-induced LV dysfunction could be prevented by pretreating the animals with either α- or ß-adrenergic receptor antagonistic drugs, or by minimizing the increase in myocardial energy demand that normally attends intense SNS activity. We conclude that massive SNS activation produces myocardial damage and depressed LV function that results from excessive concentrations of catecholamines. Furthermore, catecholamine-induced augmentation of myocardial energy demand appears to be an important factor in the pathogenesis of this disorder. (Supported by HL 43245)

Ohio Science Symposium
Promoting Academic Excellence
1:30 pm only, Friday, May 1, 1992
Gardner Student Center Hickory Room
Arranged by Duncan Neuhauser, Presiding

Co-sponsored by The Ohio Science Roundtable
The purpose of this symposium is to discuss how to improve academic excellence in Ohio's college and universities.
Three members of the Ohio Science Roundtable will present their views followed by audience participation.

Ohio Science Symposium
Science, Technology and Society
1:30 pm only, Friday, May 1, 1992
Gardner Student Center Pine Room
Arranged by Raquel Diaz-Sprague, Presiding

The purpose of this symposium is to promote awareness of ethical issues and environmental impact arising from science and technology applications and to promote humaneness, social consciousness, social responsibility, and high ethical standards in scientific institutions.

1:30 THE CHANGING PERCEPTION OF SCIENCE AND ENGINEERING IN OUR SOCIETY. Michael J. Salkind, Ohio Aerospace Institute, 2001 Aerospace Pkwy., Brook Park, OH 44142.

In his presentation, "The Changing Perception of Science and Engineering in our Society," Dr. Salkind explores the societal view of the science and engineering community. Society is not always comfortable with the rational, logical approach toward problem solving characteristic of science and engineering. Moreover, Society expects that science and engineering, a small, minority subculture, assume an important but changing role. In the 1940's, it was to win the war. In the 1950s, consumer products. In the 1960's and 1970's, Society turned against this community, holding it responsible for polluting the environment and dehumanizing life. Currently, science and engineering are viewed as nothing less than new capital to keep the economic system expanding in the face of finite resources, limited population growth, and environmental challenges. How shall the scientific and engineering community posture itself to meet this changing societal perception?

2:15 SOME MEANS OF EVALUATING TECHNOLOGY BEFORE AND AFTER ITS ADOPTION. Robert L. Vertrees, Ph.D., School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, OH 43210-1085

Technology involves the study and application of skills, techniques, and activities to produce materials and objects for practical purposes. This presentation does not directly address the interrelationships among technology, science, and society, which are complex and numerous. Rather, it provides a classification of analytical means of analysis used to evaluate technology either before or after its adoption. This classification is based on the author's experience in teaching natural resource and environmental economics and policy and in conducting research on the impacts of water resources projects and programs. The classification ranges from broad *approaches* to technology assessment, through rational-comprehensive planning and evaluation *processes* (such as multiple-objective or multiple-purpose planning), to specific planning and evaluation *methods* (such as financial feasibility and cost effectiveness studies, benefit cost analysis, and risk assessment). Detailed planning and evaluation *techniques* (such as those used in forecasting or in discounting) are not classified, but some are mentioned in relation to their application to classified approaches, processes, or methods.

3:00 HANDLING RADIOACTIVE WASTE—RESPONSIBILITIES, CHALLENGES, AND OPPORTUNITIES. Audeen W. Fentiman, 240 Hitchcock Hall, 2070 Neil Avenue, Columbus, OH 43210

Power generation, cancer treatment, agricultural research, and dozens of other activities generate radioactive waste. Our society benefits from these activities and has an obligation to ensure that the wastes are handled properly. Progress has been made toward this goal. Regulations for handling radioactive waste safely have been written. Extensive technical research has been conducted. But Ohio's citizens will ultimately shoulder the responsibility for dealing with our radioactive waste. They need access to information and a prominent role in selecting waste facility designs/locations and in monitoring facility operation.

3:30 SCIENTISTS, ENGINEERS AND PUBLIC POLICY ISSUES. Dr Harris M. Burte, WL/CA-M, Wright-Patterson Air Force Base, OH 45433-6533

The interaction between science or technology and many significant public policy issues is clear cut. The role which scientists or engineers can play in helping to resolve these issues is not as well accepted or pursued. There are two modes in which professional individuals can approach this. They can attempt to illuminate the issue with objective information by speaking within their professional expertise, or they can speak as normal informed citizens attempting to advocate "their" side of an issue in the best possible light. The former is often projected but it is difficult to achieve, and the output is frequently received as biased. My observations provide reasons for this, including the requirement for multidisciplinarity, the pressure for simple answers, the interaction of values with objectivity and the impact of vested interests. Professional societies have attempted to provide a conduit for objective input but with only limited success. Nevertheless, no positions or seriously conflicting positions from the technical community abandons the forum to instant experts or prevents best technical judgment from having a significant voice compared to those with a special ax to grind.

4:00 EXAMINING GENDER-RELATED ETHICAL ISSUES IN SCIENCE, TECHNOLOGY & MEDICINE. Raquel Diaz-Sprague, Technical Support Incorporated, 234 Oakland Park Avenue, Columbus, OH 43214-4122.

Scientists, physicians, and technologists, through their forums and institutions have a moral imperative to promote the beneficient use of technological developments. Gender-related ethical issues arising from misapplications of science and technology deserve greater and more rigorous examination. Strictly utilitarian, market-driven science or medicine lacks humanism. An irreparable damage to the public's perception and support of science results from the misuse of products of scientific research. One example of such misuse is the current controversy over silicone gel implants which have been used for over three decades, primarily

to augment the size of normal, healthy women's breasts and which is only now under federal investigation. The cultural and sociological impact of old and new technologies targetted at women some as bizarre as liposuction others as commonplace as skin care products with bogus claims of containing "anti-aging" agents or "cellular repair" agents will be examined and discussed.

4:30 PANEL DISCUSSION: H. Burte, R. Diaz-Sprague, A. Fentiman, M. Salkind, and R. Vertrees.

Moderated by: Melanie S. Kennedy M.D., Associate Dean, The Ohio State University, College of Medicine

Ohio Science Symposium
Water Quality in the Cuyahoga River
1:30 pm only, Friday, May 1, 1992
Gardner Student Center Elm Room
Arranged by Jim L. Jackson, Presiding

The purpose of this symposium is to summarize recent studies that address water use in the Cuyahoga River drainage basin.

1:30 PHYSICAL CHARACTERISTICS OF THE CUYAHOGA RIVER. J. L. Jackson, Center for Environmental Studies, The University of Akron, Akron, OH 44325-4102.

The river is small. It has a length of about 160 km and average discharge of $23 m^3 sec^{-1}$. Discharge is 0.024% of the average discharge of the Great Lake drainage basin. Pre-glacial drainage patterns were altered during continental glaciation events leaving an upper Cuyahoga River distinctly different from the lower Cuyahoga. Physical characteristics of the channel are controlled by glacial deposits, bedrock, dams, revetments and dredging.

1:50 TRANSPORT OF WATER, PHOSPHORUS AND SEDIMENT IN THE UPPER CUYAGOGA RIVER WATERSHED. E.B. Long, 3140 North Martadale Drive, Akron, OH 44333.

A three-year study of upper Cuyahoga River watershed loadings of phosphorus and inorganic suspended solids showed an average annual delivery of 31.5 tons total P and 1,770 tons 550C residue to the Coit Road bridge, located 6.7 miles above the Lake Rockwell dam. Stage/discharge measurements made at the Coit Road bridge and five other river stations during the 1985-1987 investigation permitted development of a simple mass balance model that was used to identify major point and nonpoint pollutant sources. Point source phosphorus controls now being implemented should result in the reduction of the phosphorus loading at Coit Road by about 40 percent.

2:10 SEDIMENT AND NUTRIENT EXPORT FROM THE CUYAHOGA RIVER BASIN. David B. Baker. Water Quality Laboratory, Heidelberg College, 310 East Market Street, Tiffin, OH 44883

The Cuyahoga River is one of six major Lake Erie tributaries that are included in the Lake Erie Tributary Loading Program. Since October 1982, an automatic sampler has been used to collect from 3-4 water samples per day at the U.S. Geological Survey stream gaging station at Independence, Ohio. At weekly intervals, samples are shipped to Heidelberg College for analysis of suspended solids and nutrients. The data sets now contain analyses of more than 4,000 samples. Sediment concentrations in the Cuyahoga River are similar to those in northwestern agricultural watersheds. However, the unit area export of sediment is considerably higher for the Cuyahoga than for northwestern Ohio rivers because of the higher average runoff rate from the Cuyahoga. Most of the sediment exported from the Cuyahoga River enters the stream from forested areas in the lower portion of the watershed. Total phosphorus concentrations in the Cuyahoga are similar to those of northwestern Ohio agricultural watersheds, however, the export rate is higher in the Cuyahoga. This higher rate is due to residual phosphorus loading from point source inputs. The sediment exported from the Cuyahoga River has much lower phosphorus content than sediment exported from the northwestern Ohio Rivers. The nonpoint phosphorus export from the Cuyahoga is less than that of northwestern Ohio rivers. Nitrate concentrations and export rates are much lower in the Cuyahoga River than in northwestern Ohio rivers, but are much higher than in the Grand River. The chloride concentrations and export from the Cuyahoga are much higher than for other Lake Erie tributaries.

2:30 THE EFFECT OF LAKE ROCKWELL ON THE WATER QUALITY OF THE UPPER CUYAHOGA RIVER. R.E. Carlson and G.D. Cooke, Dept. Biological Sciences, Kent State Univ., Kent, OH 44242.

Lake Rockwell acts as a real, as well as an arbitrary, delimiter of the upper and lower portions of the Cuyahoga River. During the summer little, if any, water passes over or through the dam, effectively hydrologically isolating the two portions of the river. The reservoir also acts to reduce, intensify, or to modify entering concentrations of nutrients, suspended particles, and organic matter. Inorganic particulates sediment out during periods of low water flow, but the concentration of suspended particles, is in part, reconstituted with organic particles, mainly algae, that flourish in the reservoir. Dissolved inorganic phosphorus is reduced by algal uptake, but total phosphorus concentrations may be enhanced by release of phosphorus from sediments laid down during the previous winter. The effect of the reservoir on the river's quality is seasonal, being minimal during the winter and maximal during the low flow periods of summer. Summer water quality in the reservoir itself is remarkably independent of the immediate quality of the incoming water, perhaps because of feedback mechanisms that compensate for fluctuations in incoming water quality.

3:00 PREDICTION OF RECREATIONAL IMPAIRMENT OF CUYAHOGA RIVER AFTER RAINFALL AND RUNOFF. Donna N. Myers, U.S. Geological Survey, 975 West Third Avenue, Columbus, OH 43212

Fecal-indicator-bacteria numbers in Cuyahoga River within the Cuyahoga Valley National Recreation Area (CVNRA) exceed Ohio recreational water-quality standards after rainfall and runoff. Predicting recreational impairment due to unsafe bacteria numbers is difficult because such numbers change over time and distance downstream. A 4-year study is being done to predict the magnitude and duration of impairment from bacteria in runoff. Processes controlling fecal bacteria, including transport and die off, will be simulated under changing streamflows by use of a Branched Lagrangian Transport Model. A preliminary data set was collected from a parcel of water demarcated by rhodamine WT dye injected upstream from the CVNRA after a 1-inch rainfall on September 4, 1991. Numbers of fecal-coliform bacteria in the dye cloud at four downstream locations were elevated from 10 to more than 300 times the recreational standard of 1,000 colonies per 100 milliliters. Median fecal-indicator-bacteria loading rates in the dye cloud declined from 3.2×10^{10} colonies per second at two upstream sites to 2.4×10^{9} colonies per second at the most downstream site after approximately 25 hours of traveltime. Median loading rates and numbers of *Escherichia coli* in Cuyahoga River ranged from 41 to 78 percent of median fecal-coliform loading rates and counts.

3:20 NATIONAL PARK SERVICE WATER QUALITY MONITORING 1990 AND 1991 AND RECREATIONAL USE OF THE RIVER IN THE CUYAHOGA VALLEY NATIONAL RECREATION AREA. Garree Williamson, Resource Management Specialist, Cuyahoga Valley National Recreation Area, 15610 Vaughn Rd., Brecksville, OH 44141.

In April 1990 The National Park Service began monitoring sites on the Cuyahoga River for bacterial analysis of fecal coliform and *E. coli*. Data help determine whether the Cuyahoga River, within the boundaries of the recreation area, would meet the State of Ohio criteria for the primary contact recreation use designation. Baseline data was needed to test and define a predictive model for safe recreational use based on coliform levels. 489 samples were collected and analyzed in 1990. 1990 proved to be much wetter than average, with 65.7 inches of rainfall recorded in the Akron area. Sampling and monitoring continued in 1991 to study wet weather events under more "normal" conditions, and to continue efforts to develop a method to predict instantaneous bacteria levels for the Cuyahoga River. In 1990, the wet year, all of the sampling sites exceeded the standard, compared to the dry year 1991, where all sample sites met the standard. There are still problems with CSO's, SSO's and non-point sources of pollution on the mainstem of the Cuyahoga River.

3:40 CHEMICAL AND BIOLOGICAL TRENDS IN THE CUYAHOGA RIVER, 1955 THROUGH 1991. Jeff DeShon, Mark Smith, Robert Wysenski. Ohio EPA, Northeast District Office, 2110 E. Aurora Rd., Twinsburg, OH 44087-1969.

Ohio EPA Division of Water Quality Planning and Assessment will present study results documenting changes that have occurred in the river associated with wastewater treatment improvements. Ohio EPA evaluates water quality conditions through traditional chemical analyses combined with a more innovative approach that assesses fish and benthic macro-invertebrate populations. The process is referred to as a biosurvey.

FUTURE RESEARCH AND THE REMEDIAL ACTION PLAN. Robert Wysenski. OEPA.

PANEL DISCUSSION MODERATED BY JIM L. JACKSON

Ohio Science Symposium
Solid Waste Management: An Opportunity for an Applied Learning Experience
9:00 am only, Friday, May 1, 1992
Gardner Student Center Hickory Room
Arranged by Thomas Nash, Presiding

The objective of this symposium is to demonstrate how universities can interact with government to provide students with an opportunity to sharpen problem solving skills on current issues related to solid waste management.

SOLID WASTE MANAGEMENT, AN OPPORTUNITY FOR AN APPLIED LEARNING EXPERIENCE. Panel Moderator: Dr. Thomas L. Nash, Dept. of Geography and Planning, The University of Akron, Akron, OH 44325-5005.

Over 160 million tons of solid waste will be generated in the United States this year. During the past 30 years, we have witnesed a significant rise in the total tons of waste generated. Adverse environmental and public health impacts have been linked to past solid waste disposal practices. There is a solid waste dilemma at all geographic scales. In an effort to address these pressing issues in Ohio, county officials and agencies, university professors and students have united. The mission sought by these participants is to secure the understanding and implementation of the motto reduce, reuse, and recycle. This goal is attainable by developing realistically designed plans for the local community and industry to minimize waste disposal. The consortium of participants propsed waste and cost analysis models in order to provide feasible recommendations. The organizational stages, field work techniques, preliminary accomplishments and future plans will be discussed by a panel of involved professionals and students. The objective of this symposium is to demonstrate how universities can interact with government to provide students with an opportunity to sharpen problem solving skills on current issues.

9:00 INTRODUCTION, Dr. Thomas L. Nash, Dept. of Geography, The University of Akron, Akron, OH 44325-5005 and Dr. James L. Shanahan, Director, Center for Urban Studies, The University of Akron, Akron, OH 44325-0539.

9:10 SOLID WASTE MANAGEMENT IN OHIO UNDER H.B. 592 AND A UNIQUE APPROACH TO REDUCING INDUSTRIAL WASTE INVOLVING COLLEGE STUDENTS. Jackie Mattice, Coordinator, Summit-Akron Solid Waste Management, Summit County Health Department, 1100 Graham Circle, Cuyahoga Falls, OH 44224-2992.

9:40 STUDENT PANEL: University of Akron student perspectives on their role in solid waste problem solving. Morris Wray, Leona Bowser, Scott Fricke, and Kathy Peters.

10:00 BREAK

10:20 NORTHEAST OHIO URBAN UNIVERSITY MUNICIPAL SOLID WASTE CONSORTIUM PROJECTS. Dr. Peter Clapham, Professor, Dept. of Geology, Cleveland State University, Cleveland, OH 44119.

10:40 STUDENT GROUP PROJECTS FOCUSED ON SOLID WASTE PLANNING DISTRICTS. Dr. William B. Arbuckle, Professor, Dept. of Civil Engineering, The University of Akron, Akron, OH 44325.

11:00 NORTHEAST OHIO URBAN UNIVERSITY MUNICIPAL SOLID WASTE CONSORTIUM PROJECTS. Dr. Clyde Morris, Associate Professor, Dept. of Economics, Youngstown State University, Youngstown, OH 44555.

11:20 DISCUSSION, Thomas L. Nash.

Workshop: An Introduction to Teaching Polymer Science
9:00 am - noon, Friday, May 1, 1992
Gardner Student Center Buckeye B
Melanie Stewart, Presiding

The purpose of this workshop is to introduce teachers to polymers from an historical view to the present day use and to discuss the impact of polymers on our society. Discussion will focus on the chemistry behind these materials and how that chemical structure makes polymers so diversified. Finally, through hands on experience we will investigate various experiments and testing that can be done in the lab or classroom. Emphasis will be on activities that can be done with chemicals and/or equipment which may be obtained in grocery and discount stores.

Participation limited to the first 25 paid registrants. Pre-college classroom teachers will be reimbursed for the meeting regstration fee ($25) upon submission of evidence of paid registration.

Supported in part by a grant to The Ohio Academy of Science from the Private Sector Partnership Program of The National Science Foundation.